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CHRONICLE OF THE WORLD HEALTH ORGANIZATION

FIRST ASIAN MALARIA CONFERENCE
SYMPOSIUM ON CONTROL OF INSECT VECTORS OF DISEASE

REPORTS OF EXPERT GROUPS
REVIEW OF WHO PUBLICATIONS
HEALTH LEGISLATION
NOTES AND NEWS

WORLD HEALTH ORGANIZATION
PALAIS DES NATIONS
GENEVA

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The World Health Organization (WHO) is a specialized agency of the United Nations and represents the culmination of efforts to establish a single intergovernmental health agency. As such, it inherits the functions of antecedent organizations such as the Office International d'Hygiène Publique, the Health Organization of the League of Nations, and the Health Division of UNRRA.

WHO had its origin in the proposal made at the United Nations Conference held in San Francisco in 1945 that a specialized agency be created to deal with all matters relating to health. In 1946, representatives of 61 governments met at the International Health Conference, New York, drafted and signed the WHO Constitution, and established an Interim Commission to serve until the Constitution could be ratified by 26 Member States of the United Nations. The Constitution came into force on 7 April 1948, the first World Health Assembly met in Geneva in June 1948, and on 1 September 1948 the permanent Organization was established.

The work of the Organization is carried out by three organs : the World Health Assembly, the supreme authority, to which all Member States send delegates; the Executive Board, the executive organ of the Health Assembly, consisting of 18 persons designated by as many Member States; and a Secretariat under the Director-General.

The scope of WHO's interests and activities exceeds that of any previous international health organization and includes, in addition to major projects relating to malaria, tuberculosis, venereal diseases and treponematoses, maternal and child health, nutrition, and environmental sanitation, special programmes on public-health administration, epidemic diseases, mental health, professional and technical training, and other public-health subjects. It is also continuing work begun by earlier organizations on biological standardization, unification of pharmacopoeias, addiction-producing drugs, health statistics, international sanitary regulations, and the collection and dissemination of technical information, including epidemiological statistics.

* * *

The *Chronicle of the World Health Organization* is published in English, French, Spanish, and Chinese editions. It contains general information on the Organization, its principal activities, the meetings of its expert committees and other advisory bodies, as well as summaries of its main technical publications. Material from the *Chronicle* may be reproduced in the professional press, providing due acknowledgement is made.

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CHRONICLE OF THE WORLD HEALTH ORGANIZATION

CONTENTS

Page

First Asian Malaria Conference 117
Control of insect vectors of disease; WHO symposium, Rome — October 1953 129

Reports of Expert Groups
- Poliomyelitis 136
- Rabies 139
- Rheumatic diseases 142
- Alcohol as a drug 144
- Sanitation in rural areas and small communities 146

Review of WHO Publications
- A basic work on plague 148
- Mortality from transport accidents 149

Health Legislation
- Comparative study: smallpox vaccination 151

Notes and News
- Executive Board: thirteenth session 153
- Darling Foundation Prize to be awarded at Health Assembly 153
- Eighth World Health Assembly may be held in Mexico 154
- New Regional Director for Africa 154
- Waterworks Seminar in South-East Asia 154
- World Health Day: 7 April 1954 154
- Sixth Seminar on World Health 154

SCHEDULE OF MEETINGS

22 March-10 April	**Advanced course for waterworks engineers, Netherlands and Belgium (Regional Office for Europe)**
28 March-10 April	**Seminar on the Prevention and Treatment of Alcoholism, Nordwijk, Netherlands (Regional Office for Europe)**
29 March-3 April	**Expert Committee on Nursing, third session, London**
9-13 April	**Joint ILO/WHO Committee on the Hygiene of Seafarers, second session, Geneva**
22-30 April	**Pan American Sanitary Organization, Executive Committee, twenty-second meeting, Washington, D.C.**
29-30 April	**Joint Committee on Health Policy, UNICEF/WHO, seventh session Geneva**
4 May	**Seventh World Health Assembly, Geneva**
27 May	**Executive Board, fourteenth session, Geneva**

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FIRST ASIAN MALARIA CONFERENCE *

The First Asian Malaria Conference, convened by the World Health Organization, met in Bangkok from 21 to 24 September 1953. It was attended by government delegates, representatives of bilateral and international agencies, one member of the WHO Expert Committee on Malaria (fifth session), and several observers (see page 127).

A questionnaire had been prepared by WHO, requesting precise information about the present status of malaria control and plans for the future. This was distributed to the various governments of the South-East Asia, Eastern Mediterranean, and Western Pacific Regions to provide basic documentation for the debates of the conference. The great interest of the governments in the Asian and Western Pacific areas in malaria control was evidenced by the painstaking replies to this questionnaire. These made clear the magnitude of the problem as well as of the malaria-control work now in progress. No fewer than 590 million people live in areas represented at the conference; this number constitutes nearly one-fourth of the world's total population. It is estimated that half of these people were living a few years ago in areas subject to malaria fevers, but that in 1952 over 47 million were being protected from this disease.

The conference was opened by His Excellency Dr. Phya Boriraksh, Minister of Public Health, Thailand, who gave an address. Addresses were also given by Dr. C. Mani, Director of the Regional Office for South-East Asia; Dr. Paul F. Russell, member of the recent Expert Committee on Malaria of WHO; Dr. E. J. Pampana, Chief of the Malaria Section, WHO, Geneva; and Dr. F. J. Dy, Adviser on Malaria, Western Pacific Regional Office. Dr. Luan Ayurakit Kosol was elected Chairman, Col. Jaswant Singh, Vice-Chairman, and Dr. K. C. Liang, Rapporteur. Dr. F. J. Dy was appointed Secretary.

* This is the report on the First Asian Malaria Conference, as adopted by the participants.

PRESENT STATUS OF MALARIA CONTROL

Several reports were presented to the conference that confirmed once again that in most countries of the three regions residual insecticidal spraying has been effective in the control of malaria. The results thus far achieved on such a wide scale clearly demonstrate that, for a great majority of areas, climate, environment, type of house, habits of population, and social conditions do not prevent the effective control of malaria by residual spraying. The cost of malaria control by residual spraying is now so low that only rarely can it be said that malarious communities cannot afford to control the disease.

It is known that the habits of most malaria vectors are such that they are susceptible to control and sometimes even to eradication by residual spraying. In the case of a very few species that prefer to rest and feed out of doors, however, there remains some doubt as to the degree of contact between the insect and the insecticide. The conference noted that in several areas where effectiveness of residual spraying is still to be proved, experimental projects are in progress. For example, the Dutch Government is starting an investigation to find out whether malaria carried by the *A. punctulatus* group can be controlled by these methods; and a pilot project is being carried out by the Government of Sarawak, with WHO assistance, to determine whether *A. leucosphyrus* is suscept-

ible to this method of control. It was noted with satisfaction that in the Philippines, with WHO expert assistance and Foreign Operations Administration (FOA) equipment and supplies, it has already been demonstrated in Mindoro that malaria carried by *A. minimus flavirostris* can be effectively controlled by DDT residual spraying.

During the discussion it became evident that, because certain species of malaria-carrying mosquitos rest more frequently on treated surfaces than others, they are more susceptible to control. Therefore, the speed with which a country approaches the end-point of malaria transmission will depend in a considerable measure on the habits of the local malaria vectors. In some cases a country may quite rapidly achieve its objective, while in others there may be more difficulty because of more elusive anophelines.

Apart from the direct influence of anti-malaria residual spraying in reducing malaria mortality and morbidity, collateral benefits have been observed, such as lowering general and infant death-rates, and control of other insect-borne diseases, such as plague and cutaneous leishmaniasis—e.g., in several Indian States.

In the countries represented at the conference, no development of DDT resistance in *Anopheles* has been reported. In certain areas, bed-bugs appear to have become resistant, and flies have not been controlled by residual spraying. The conference was also aware that in Korea lice have not been controlled by DDT. Obviously, any observation of resistance should be carefully controlled as regards all factors, one of which is the potency of the insecticides.

The conference was informed that in some countries supplies of DDT water-dispersible powder which were said to comply with the specifications laid down by the WHO Expert Committee on Insecticides actually had deteriorated physically and chemically a short time after analysis had shown them to be satisfactory. Recommendations regarding storage, packing, and transport of DDT were suggested by the Indonesian delegation. Apparently, physical deterioration of DDT water-dispersible powders may be associated with chemical decomposition of about 50% of the insecticide itself. The conference was informed that members of the WHO Expert Advisory Panel on Insecticides had arranged for a series of tests whereby different lots of DDT water-dispersible powder would be analysed, subjected to heat treatment to simulate tropical conditions, retested, and afterwards shipped to the Port Harcourt Laboratories, Nigeria, where they would be stored for months. After three, six, and nine months, samples would be shipped to the laboratories where the preliminary analyses had been conducted, and would be tested again. The object of this study is to determine whether and why DDT water-dispersible powders, after storage under conditions of pressure and high temperature, would lose their suspensibility.

SOCIAL AND ECONOMIC BENEFITS OF MALARIA CONTROL

The conference considered the social and economic benefits that may follow malaria control. Government finance officers and legislative bodies whose budgetary requirements usually exceed by far their available financial resources can quite naturally be expected to scrutinize any proposed health projects in terms of fiscal as well as humanitarian returns to the citizens whose taxes must support the programmes. From the countries represented at the conference there have come numerous examples of material as well as socio-economic benefits from all monies invested in malaria control. Well-documented experience from malaria-control projects already under way lend increasing support to the statement by Dr. Paul F.

Russell that " No country with a serious malaria problem can afford *not* to control malaria." More and more concrete evidence is accumulating to show that investments in malaria-control efforts will be returned many-fold in the opening up of lands to agriculture, lumbering, and mining; in the increase in individual and family income through prevention of debilitating illness, hospitalization, and untimely death; and in the removal of obstacles to the building of roads, dams, communication lines, and other facilities so essential to development.

The following examples demonstrate but by no means exhaust the variety and magnitude of tangible economic benefits accruing from malaria-control programmes.

Agriculture

For many years there has been a familiar slogan in Afghanistan : " If you want to die, go to Qundus." This notoriety was well deserved, for those farmers who tried to work the rich lands in Qundus were inevitable victims of severe, if not fatal, attacks of malaria. Land sold in 1935 for 4 Afghanis per acre (approximately $0.19); in 1952, the price was 5,000-10,000 Afghanis per acre (approximately $238-$476), an increase due largely to absence of malaria.

In the Ghuri District of Afghanistan, the price of land before malaria control was 300 Afghanis per acre; by 1952, when malaria-control measures had removed the threat of this disease, land in the Ghuri area became highly priced, and values reached a level of 5,000-8,000 Afghanis per acre.

Ceylon, with 12,000 square miles (31,080 km²) of uninhabitable malarious jungle, has, since malaria control became effective in 1947, reclaimed and brought under irrigation more than 206 square miles (about 534 km²) for new settlements. More than 91,000 landless people have now been established in 26 new colonization schemes.

In Kanara District, Bombay State, India, more than 50 square miles (about 130 km²) of arable land which were fallow because of malaria have now been brought under the plough through antimalaria measures during the past seven years.

Work-days saved

In northern Thailand a socio-economic survey established that each malaria case was incapacitated for an average of 7.6 days. In DDT-sprayed areas with a population of 282,065, more than 50,000 malaria cases are estimated to have been prevented within one year after control began. Since about half of the population is known to be composed of workers, this means that not less than 25,000 work-weeks, or 175,000 man-days, were saved.

In Thailand a minimum of 10,000,000 work-days are lost each year because of malaria. This represents a loss of not less than Baht 100,000,000 ($5,000,000) each year—15-20 times the required yearly budget for a permanent programme of malaria control.

In India, the annual labour losses due to malaria have been calculated at the astounding figure of 171,000,000 work-days in the agricultural population. As regards Bombay State, for example, the annual cost of 15,000,000 work-days lost is estimated at Rs. 30,000,000 in wages ($6,299,874).

Family income

Detailed economic surveys were made among families of all income groups in an irrigated area of Mysore State, India, before and after DDT residual house-spraying for malaria control. Consideration was given to the actual losses due to malaria through such costs as those of medical and spiritual care of malaria cases, lost earnings, funeral expenses, decreased value of untended lands

and livestock, and prolonged indebtedness. These surveys arrived at a minimum estimate of Rs. 498,898 ($104,766) saved by 730 families during one year of malaria control. In Mysore also, a great increase in milk production was noted following DDT spraying. It was stated that for every rupee spent on DDT spraying there was a gain of 93 rupees during the year, as measured by the comparison with the unsprayed area.

Industrial development

In the Pulikhumri textile mills of Afghanistan, malaria-control efforts have achieved an industrial revolution. Before antimalaria measures were instituted, it was difficult to obtain labour to keep the mills operating, and substantial incentive allowances had to be paid to offset the health hazards to which the workmen were exposed. Residents in Pulikhumri town numbered less than 5,000 people. Output of the mills amounted to 20,000 metres (about 21,880 yards) per day. As a result of malaria control, the population of the town has risen to 20,000 persons. By 1952 the output of the mills had increased to 35,000 metres per day (about 38,290 yards), and plans have been made to enlarge the factory and install more machines.

Construction projects

In times past, construction of highways and other public works in the Philippines has often failed because of the high malaria rates among the workmen. In making their bids, contractors estimated that three men must be hired for every two men they needed on the job. But contractors are now eagerly bidding on Government road-building in the Philippines because the Department of Health is guaranteeing protection from malaria by special malaria units. As a result, the bids on new construction projects are being submitted at lower figures than ever before, and completion of the projects is assured.

In another example from the Philippines, the construction of dams and pipelines for the Manila water-supply was threatened because of high malaria rates among the workmen. The Department of Health instituted malaria control in the area, and the project was completed on schedule.

Effects on population and vital statistics

Before 1946, in Kanara District, Bombay State, India, the birth-rate was about 29 per 1,000, and the death-rate was 23-30 per 1,000. DDT residual house-spraying for malaria control began in the District in that year. In 1952 the birth-rate was 33 per 1,000 and the death-rate was 14 per 1,000. The malaria death-rate dropped in the same District from about 3 per 1,000 before 1946 to 0.4 per 1,000 in 1952.

In Ceylon, the malaria death-rates before 1946 varied from 0.8 to 1.8 per 1,000. Following DDT residual house-spraying operations, the rate has dropped to 0.2 (1952). Birth-rates have more or less stabilized at 40 per 1,000, but death-rates have dropped from 21 to about 13 per 1,000.

ORGANIZATION, METHODS, AND FINANCING OF PROGRAMMES

One of the main objectives of the conference was to discuss the best and most economical type of antimalaria service.

Central antimalaria organization

In Taiwan, where a four-year malaria-control programme is in progress, there is a central antimalaria organization the functions of which are training; research; planning; and standardization of techniques, equipment, and formulations. These functions are carried out primarily through the

Provincial Malaria Research Institute and its two branches in the north and in the centre of the island. There are on the island 370 township health stations, of which 155 have at least a malaria technician who is in charge of the local antimalaria work. Furthermore, there are 21 health centres which include malaria control among their activities.

Various speakers pointed out the need for, and the advantages of, a strong central malaria-control organization responsible for planning, training, research, and standardization of equipment and formulations. In Afghanistan, Indonesia, East Pakistan, the Philippines, and Thailand, this type of organization is found, though implementation of the control operations is more or less decentralized. As regards surveys, laboratory work, and assessment of results, practices differ : in some countries this work is done essentially by the central organization, in others the responsibility is shared with local organizations.

It was emphasized that the type of malaria organization in each country will depend on the degree of evolution of the health organization of the country. In a well-organized health service like that of Ceylon, it was possible to have only a small, specialized, central, antimalaria organization for survey and organization, the routine and control operations being integrated with general public-health work carried out by medical officers of health. In Mysore also, malaria control has been largely integrated in the general programme of rural health units, though there is a central organization for direction, supervision, training, and financing. In countries with a less-developed public-health service, if malaria is the main public-health problem, it is not feasible to include its control among the general tasks of the medical officers of health. In India, with its varying stages of public-health development, it was found necessary to set up specialized malaria sections both at the central and at the peripheral levels in many States. In Bombay State, after many years of satisfactory malaria-control, there is a trend to achieve greater integration with general health activities, though the central malaria service has organized appraisal squads that make survey checks in approximately 10% of the villages.

Salaries and allowances of malaria staff

In some parts of India, a considerable disparity was noted in the remuneration of malaria workers employed by different agencies in the same area. Similar disparity was reported between malaria officers and health officers of corresponding ranks (e.g., in Punjab). Although the malaria inspector's work is much harder than that of the sanitary inspector, the former was paid only the same salary that the latter received.

In Thailand, there is no difference in the salary between a medical officer working in a hospital and a malaria officer of the Division of Malaria Control, but the medical officer has a much higher income because of private practice. It has become difficult to persuade young graduates to become malaria officers.

Several speakers suggested that provision of free accommodation be considered.

The opinion was unanimously expressed that under-payment of malaria personnel made it difficult to keep good men in the malaria service.

Community participation and special taxation

It was pointed out that community participation by supplying voluntary labour has been tried in many places and found to be entirely unsatisfactory. It is often advisable, however, for malaria-control organizations to hire local labour. Community participation may consist in the provision of funds,

transport, and housing and assistance in operations through appropriate education of the public.

As malaria control is a service which increases the earning power of a population, raises the real estate value, and contributes to the welfare of the people, it would seem that levying a tax among the inhabitants that directly benefit from malaria control might be justifiable. The conference was informed that in some instances such a tax had indeed been applied; in Mysore State, for example, a malaria tax of 6 pies (less than $0.01) per person is levied. Even in the USA, in certain areas, a malaria tax has been levied at times and has made possible the completion of permanent antimalaria work. Other examples were given for European countries. Various speakers were of the opinion that other sources of income, such as national sweepstakes or lotteries, would be preferable to a malaria tax, as the latter might make malaria control unpopular; others preferred that antimalaria activities be dealt with by the regular and usual method of annual budgeting. It was emphasized that, at any rate, should a tax be levied on the population of a malaria-stricken area, it should be applied only after control had been effectively instituted and the population had, therefore, already benefited from it. Recognizing that a malaria tax would most probably be unpopular, the conference was of the opinion that any tax that could reasonably be levied should be of a general nature, related to the enhanced economy of the area following the establishment of malaria control.

Financing of malaria control

It was pointed out that in planning malaria control as a service of public health to the people, provision should be made for the necessary funds from national, central, or local sources. Financial assistance from international agencies should be accepted as a contribution towards an accelerated expansion of the programme, provided adequate provision is made for continuity of the project once international assistance comes to an end. As the maintenance and stability of the malaria-control services are vital for the continued safeguarding of the health of the people, the allotment of adequate funds for the continuation of the malaria-control services should be ensured. The methods of securing funds for this purpose would naturally depend upon local circumstances in each country and the extent to which community participation would be locally available. It was suggested that in some instances it could be a good investment for a national or local government to use deficit financing by bond issue or other means in order to bring malaria transmission to an end-point. A public opinion well aware of the social and economic benefits brought about by the control of malaria might assist in creating a public demand for funds. Indoctrination of public officials on the advantages of malaria control should be undertaken in most countries.

PLANNED DEVELOPMENT OF NATIONAL MALARIA-CONTROL PROGRAMMES

Priorities in residual spraying programmes

The conference discussed the basis on which priority might be given to certain areas in the planning of national malaria-control programmes. Most commonly the first areas to be put under control are either those where malaria has the highest endemicity or where malaria control will have the greatest economic impact. In some cases, as in the Punjab and in Ceylon, the deciding factor was that of epidemic conditions. In these countries the first areas to be residually sprayed were those subject to flooding by

monsoon rains in the former, and subject to river pooling due to lack of monsoon rains in the latter. It was pointed out that priority in some countries should be given to areas in which there were non-immune immigrants.

Many of the delegates agreed that it may be dangerous to the success of a national malaria-control scheme to omit pockets of high endemicity even though such areas do not have economic importance. However, it was pointed out that in Bombay, at the beginning of the programme, villages of less than one hundred people were not sprayed because of the greatly increased cost of dealing with scattered houses. These islands of malaria did no harm to the surrounding areas under control and were useful contrast examples. They are now included in the routine spraying.

Each country in deciding priorities should be guided by a general consideration of all the local factors involved.

Planning for cessation of international aid

The conference noted that there is no certainty that international aid monies will be continuously available for malaria-control programmes, and it stressed the need to develop types of projects that could be maintained by routine national or local budgetary funds. It noted with satisfaction that malaria has been almost completely eliminated from Ceylon without foreign aid monies and that to an increasing extent national and local funds are being used in other programmes. The conference further noted that, in order to bring malaria-control costs to levels that would be within the range of routine budgetary funds, further experimentation is required in organization, training, and insecticidal practice for greater efficiency.

The conference noted that foreign aid monies are usually given on the condition that the countries continue control measures, and it was believed that usually public demand for residual spraying programmes would ensure continuance of the schemes. It was also pointed out by several delegates that initial costs of control schemes are usually much greater per person than later annual recurring expenses, so that once a scheme was well developed the annual cost might be as much as 30% less than in the beginning.

Although one or two delegates were somewhat apprehensive about cessation of foreign aid, it was the opinion of the conference that malaria-control schemes would for the most part be carried forward by national or local financing.

Discontinuance of residual spraying when malaria approaches an end-point

The conference called attention to the importance in countries where malaria is approaching an end-point of determining to what extent, and during what time intervals, residual spraying might safely be discontinued. No examples of such interruption in spraying have been reported in Asia, but this practice has been successfully used in Greece and elsewhere. It was pointed out that there are no guides for predicting when a given country may be expected to reach an end-point of malaria transmission and that such predictions may be misleading. In some areas, particularly in the equatorial, wet, seasonless zones, it may be a very long time before malaria transmission is brought to an end-point. It was also emphasized that interruption of spraying presupposes not only that the menace of malaria transmission has been removed, but also that there are effective safeguards, such as a clear understanding of the epidemiology of the disease, specially trained and vigilant personnel, and, particularly, an inter-country co-ordination of malaria-control programmes that would minimize the dangers of imported malaria.

The consensus of opinion at the conference was that the time has not yet come in Asian regions when discontinuation of residual spraying may safely be practised, but it is hoped that such time may come eventually.

REGIONAL CO-ORDINATION OF LONG-TERM PROGRAMMES

The first problem that confronted the conference in relation to inter-country planning was the question as to what extent and how a national malaria-control project should be planned or adapted so that help and not hindrance would be given to, and received from, similar national malaria-control schemes in neighbouring countries. The same question applies to certain State projects on the one hand, and to regional programmes on the other. Malaria control is now so effective that countrywide elimination of the disease as a public-health problem is foreseeable. But, if by lack of inter-country or inter-state co-ordination there is danger of reinfection of malaria-free areas from across national or regional borders, a vicious cycle might be set up, the attainment of an end-point to malaria transmission might be postponed, and savings through interruption of residual spraying might be delayed. Obviously, for reasons both selfish and altruistic, border zones and those areas that have a significant exchange of travellers or immigrants might well be put under effective control concurrently. The uniform practice of control throughout the malarious parts of a region, especially in large contiguous areas having similar conditions, even though they fall in two or more national territories or WHO Regions, is clearly an ideal to be aimed at. Co-ordination of control as regards methods, timing, and boundaries is necessary; and, in later stages, close integration is desirable in any discontinuation of residual spraying and in the practice of safeguards against recurrence of transmission. Political barriers should not be obstacles to control programmes.

The conference noted the resolutions that had been adopted by the Regional Committees for South-East Asia and for the Western Pacific, at recent meetings, in which Member countries were requested to envisage the planning of large-scale and long-term programmes of malaria control to the extent that their resources would permit, and to consider all means of integrating national malaria-control programmes into sub-regional, regional, or inter-regional programmes of malaria control.

Several examples of inter-country co-ordination for the control of insect-borne diseases were recorded. In Africa, between French Equatorial Africa and the Belgian Congo, co-ordination in trypanosomiasis control had been achieved between the health officers of both countries, who are allowed to contact each other and work together in either country without administrative hindrance. Standardization of methods has been obtained and efficiency of work increased. In Bolivia, Chile, and Peru, after independent initial surveys, typhus control has been undertaken under the supervision of an inter-country commission consisting of the three health ministers and co-ordinated by the Pan American Sanitary Bureau. Health officers assigned to these campaigns go freely from one country to another according to the needs of the control project. Such co-ordination could be extended to malaria control. A pioneer example is being developed between Sarawak, North Borneo, and Brunei, with WHO assistance. It is hoped that a similar scheme may eventually include Indonesian Borneo. Such co-ordination and co-operation would obviously achieve a sharing of knowledge and experience, would effect savings, and would permit the pooling of personnel, equipment, and supplies.

Mention was made of another case of similar co-operation in the Americas between Venezuela and Colombia for the purpose of malaria control in their common border areas. In this scheme, either Venezuelan or Colombian DDT squads may freely operate in the border zones of either country.

There was a general trend of opinion in favour of an informal approach, for the present, towards inter-country co-ordination of planning. When large-scale programmes have achieved results, formal negotiations might be necessary. It was pointed out that international agencies should be included when planning inter-country co-ordination of antimalaria projects. Perhaps the existing health co-ordination committees in many countries of the regions might expand and assist in inter-country planning. The Regional Director for South-East Asia reminded the conference that constitutionally it was WHO's task to function as a co-ordinating body in international health work. Co-ordination, however, could only be achieved with the consent of the very parties who are responsible for the creation of WHO. He thought that co-ordination could be achieved between regions and countries through the medium of the respective regional offices. The regional offices could call in other international organizations that would be interested and helpful.

Unfortunately, long-term inter-country planning may not be predicated on continuing international aid because of the fact that national or international budgets are usually appropriated on an annual basis.

The conference emphasized that annual or biennial meetings like the present one, held under the sponsorship of WHO in different countries, would serve a very useful purpose in the co-ordination of inter-country malaria-control planning and operations. Such meetings should consider the organizational as well as the technical aspects of malaria control.

The conference discussed the importance that should be given to the training programmes necessary for the implementation of malaria-control plans, including ways and means whereby WHO could help. Such points were raised as the adequacy of the present facilities for training; the feasibility of widening the scope of international facilities already available in certain training centres, such as the Malaria Institute of India, with WHO assistance; the question of sponsorship by WHO of malaria training courses in Asia; the helpfulness of WHO visiting lecturers; and the need for additional malaria fellowships.

It was the consensus of opinion that the auxiliary personnel needed for malaria control could be trained locally if facilities were available, but that it would still be advantageous and desirable that the key professional staff who would ultimately be in charge of control programmes and of training auxiliary personnel receive the benefit of training abroad.

Hope was expressed that regional malaria training courses in malariology, such as those conducted in Singapore with the assistance of the League of Nations, might be provided with WHO assistance, for the benefit of auxiliary as well as key malaria-control workers. It was considered not enough for key personnel to obtain experience in their own countries only, however good and successful their own schemes might be. Some expressed the opinion that countries where institutions are available for the training of key personnel should offer or continue to offer training to personnel of other countries in addition to their own, and that each country should decide the extent to which it will use training facilities abroad.

There was general agreement that adequate training should be given to sufficient numbers of auxiliary personnel for the implementation of local programmes. The conference stressed the importance of sending

WHO visiting lecturers to malaria training centres. It was emphasized, however, that these lecturers should be conversant with the problems of the countries or region from which the trainees come.

WHO could render valuable help in supplying books and teaching equipment and materials to malaria institutes, and in disseminating information on the methods, techniques, syllabuses, etc., being used in various countries.

CONFERENCE RECOMMENDATIONS

The First Asian Malaria Conference made a number of specific recommendations regarding malaria control :

Present status of malaria control

The conference,

Having discussed the present status of malaria and its control in Asian countries,

Having noted with satisfaction that large numbers of people are being protected by modern methods, but having also noted that relative to the whole problem only a beginning has been made,

Realizing that very considerable additional support, financial and otherwise, will be required from governments, and knowing that such support will require substantial justification,

RECOMMENDS

that every effort be made to evaluate carefully the results of antimalaria projects and to measure morbidity- and mortality-rates, not only for malaria but also for other diseases affected by control measures; and, in particular, to obtain more precise measurements of economic benefits and a clearer estimation of social improvements resulting from malaria control.

Organization methods and financing of the programmes

The conference,

Having considered various types of organization of malaria services,

CONCLUDES

that every country where malaria is a major public-health problem should possess a permanent antimalaria organization, adequately staffed with adequately paid personnel; and that, where malaria until recently has been a problem, there should remain an organization adequate to cope with any recurrence of the problem.

While there are advantages in decentralizing the operations of malaria control, a central organization is necessary to deal with research, training of personnel, assessment of results, and standardization of methods, equipment, and supplies. In large countries where State or provincial autonomous antimalaria services may exist, the central national organization should give technical guidance and higher training, and should assist in co-ordinating the activities of the State or provincial malaria services on a nationwide plane.

Planned development of national malaria-control programmes

The conference,

Having considered the possibility that foreign-aid monies now provided for residual spraying control of malaria may one day no longer be available,

RECOMMENDS

(1) that, in the planning and carrying out of national control programmes, every effort be made to reduce per person costs to a point where they can be met by routine budgetary funds;

(2) that, with a view to increasing efficiency and lowering costs, further experimentation

be carried on in the organization of malaria-control schemes, the training of personnel, and insecticidal practice.

Regional co-ordination of long-term programmes

1. Co-ordination of planning

The conference,

Impressed by the enormous impetus acquired by malaria control in most of the Asian countries,

Appreciating the invaluable assistance given to many governments by international and bilateral agencies and organizations,

Hoping that such assistance may be continued until the objective of the elimination of malaria as a major public-health problem is obtained, and

Convinced that it is highly desirable to obtain malaria control simultaneously in as large areas as possible, both for increasing the efficiency of the campaign and for saving expenses and eventually discontinuing the campaign after the end-point of malaria transmission is reached,

RECOMMENDS

(1) that in planning malaria-control programmes the principle of merging the areas of control both within and outside the borders of the countries concerned, on an inter-country, intra-regional, and inter-regional plane be followed; and

(2) that WHO offer appropriate assistance for the co-ordination of national plans through its regional offices, and if need be, through other suitable methods, such as inter-regional conferences and committees.

2. Training

The conference,

Having considered the importance that should be given to training programmes necessary for the implementation of malaria-control plans, and

Having discussed the possible role of WHO as regards this training,

RECOMMENDS

(1) that governments endeavour to provide suitable training to adequate numbers of malaria-control personnel of all levels;

(2) that WHO explore the possibility of convening periodic meetings on the organizational and technical aspects of malaria control which would provide an excellent medium for an interchange of ideas and experiences;

(3) that WHO assist governments in training local malaria-control personnel by providing fellowships, visiting lecturers or consultants, and regional malaria training centres, by supplying books and teaching equipment and materials; and by disseminating information on methods and techniques being used in various countries.

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CONTROL OF INSECT VECTORS OF DISEASE

WHO Symposium, Rome — October 1953 *

The reliance placed on chemicals during the past decade in the fight against insect vectors of disease and the failure of some of the commonly used insecticides to maintain control of certain species have given rise to complex problems. The nature and significance of these appeared to justify a broad review by a group of experts in order to formulate, so far as was possible, both immediate and long-term plans. In consequence, a symposium on the control of insect vectors of diseases was convened in Europe jointly by the Regional Office for Europe of the World Health Organization and the Istituto Superiore di Sanità, Rome. This symposium was held in the premises of the Institute in October 1953 and was attended by 24 experts from 11 countries with a wide geographical distribution. (The names of the participants are given on page 134.) Professor P. A. Buxton, C.M.G., F.R.S., of the London School of Hygiene and Tropical Medicine, was Chairman.

Eighteen papers were presented at the various meetings. These will be published in the *Rendiconti; Istituto Superiore di Sanità*.[1] The more important findings which arose from these papers, from the lectures delivered, and from the discussions are set out in this report.

GENERAL

The purpose of the symposium was to discuss the control of the insect vectors of human diseases. It was a matter of general agreement that the principal method of control was the use of insecticides, and the most difficult problem, the development of resistance to insecticides.

It is evident that resistance develops through a complex chain of events. Nevertheless, the problems posed are not more difficult than those already solved in comparable fields. Given detailed study of insect physiology and biochemistry and free research, an eventual favourable outcome is a reasonable certainty.

DEFINITION OF RESISTANCE

To avoid misunderstanding of the use of the term " resistance ", the following definition was agreed upon for use in the discussions :

" Resistance to insecticides is the development of an ability in a strain of an insect to tolerate doses of toxicants which would prove harmful to the majority of individuals of a normal population of the same species. The term ' behaviouristic resistance ' describes the ability to avoid a dose which would prove harmful."

EXTENT OF THE PROBLEM

Since the first detection of significant resistance of the housefly to DDT in Italy in 1947, the problem has been recognized in at least 32 countries. Published records appear to indicate that it involves approximately 35

* This report was prepared by a drafting committee at the express wish of the participants in the Symposium on the Control of Insects, Vectors of Disease, which was held from 26 to 31 October 1953 in Rome. A previous article, based on documentation prepared for the symposium, appeared in the January *Chronicle* (1954, 8, 3).

[1] Copies of the relevant issue of the *Rendiconti* can be supplied by the Istituto Superiore di Sanità, Viale Regina Margherita 299, Rome, Italy, or may be obtained on request from the Regional Office for Europe, World Health Organization, Palais des Nations, Geneva, Switzerland.

species of insects of medical or pestiferous importance. A number of the records are not conclusive, but in 26 cases the reports have been confirmed by experiment and involve 19 insect vectors of disease.

The resistance of the housefly to DDT and other chlorinated hydrocarbon insecticides is almost worldwide and is the most important current aspect of the problem. The failure permanently to control the fly by the use of insecticides has, at least for the moment, interfered seriously in the fight against infant diarrhoea and dysentery—diseases which are reported to owe their transmission to flies in up to one-third of cases in certain outbreaks.

Probably the greatest value of the new insecticides is in the control of malaria; but, as has repeatedly been observed, public support for programmes is largely related to control of the housefly, which to the average person represents a greater nuisance than the malaria-carrying mosquito. To the extent that programmes no longer effect satisfactory fly control, public support for malarial control by insecticides undoubtedly does diminish in some communities.

Of great potential importance is the appearance of increased resistance among certain species of anophelines. In most instances this resistance has not developed to the extent that control of the disease is jeopardized, but an appraisal of the problem and advance planning appear to be an absolute necessity. Eight species of malaria vector have been reported to show some degree of acquired resistance, but not to an extent sufficient to interfere seriously with control programmes. Among mosquitos, high resistance has been developed by certain troublesome species, particularly the salt-marsh mosquitos, *Aëdes solicitans* and *Aëdes taeniorhynchus*. *Aëdes nigromaculis* has become resistant in California, as has *Culex tarsalis*, a vector of encephalitis.

At least five species of flea have been reported resistant, one of which is the human flea, *Pulex irritans*. The resistance of body lice in Korea and Egypt is sufficient to preclude their successful control by DDT, but they succumb readily to certain other chlorinated hydrocarbon insecticides, as, for example, BHC. Another disease vector which has developed resistance is *Triatoma*, the vector of Chagas' disease in some parts of South America. In addition to these known disease vectors, bed-bugs and several species of roach and a few ticks have been reported to have developed resistance.

It appears essential, therefore, that attention be directed to a careful evaluation of resistance as it arises in different countries, and that some machinery be established to exchange information on all aspects of resistance, including the possibility of other measures of control.

Although the problem is a serious one, it has been exaggerated. Resistance among the more important disease vectors is limited, and this is encouraging in view of the large quantities of DDT and other insecticides used throughout the world during the past six years. Other chemicals now available are capable of controlling species which have acquired resistance to DDT, with the exception of the housefly and possibly two or three species of mosquito. Development of resistance to the new chemicals is also probable, but the present range of compounds is such as to offer an interval of time for better elucidation of the mechanism of resistance and for devising means to meet the situation. Certainly, there is no time to spare.

Various members of the symposium suggested methods for the future orientation of vector-control programmes, both in the presence and in the absence of resistance, and these are described in the next section of this report. These procedures appear to offer the best prospects for maintaining control of vector-borne diseases, even in the presence of resistance.

SUGGESTIONS FOR FUTURE ORIENTATION OF INSECT-CONTROL PROGRAMMES

Early recognition of resistance

An attitude of careful watchfulness should be maintained to detect the earliest indications of resistance among species now susceptible. It is suggested that a widespread surveillance programme be initiated to determine the susceptibility status of vectors to insecticides.

The first indication of resistance to insecticides is generally observed in the field. However, this is only qualitative, and reproducible quantitative tests, carried out in the laboratory under controlled conditions, are required to establish that resistance has developed, except in instances where resistance is advanced. The test developed for use in the global, WHO-sponsored survey of the susceptibility of body lice to insecticides is an example. Test methods of equal simplicity and effectiveness should be developed for other insects.

Base lines for the susceptibility of insects of medical importance to the modern insecticides should be determined. An attempt should be made to establish by laboratory methods the median lethal doses of the more important chlorinated hydrocarbons and organophosphates to *Musca*, *Anopheles* sp., *Aedes* sp., *Culex* sp., and other insects of medical importance.

The figures for contact and residual toxicity could be expressed as micrograms per gram of body weight, regardless of the method used. Although microloop and microsyringe give this figure directly, conversion factors should be ascertained so that field methods of test, using treated surfaces, can be expressed in this basic figure.

Before vector-control programmes using insecticides are initiated, it is recommended that estimates be made of the sensitivity of insects to various insecticides, establishing a base line of susceptibility of the species concerned. Tests should be continued during the development of the field work.

Improvement of existing methods and development of new techniques

Prospects for finding substitute chemicals for the control of insects already resistant to the chlorinated hydrocarbon insecticides are favourable. Perhaps the best possibilities are for the organic phosphorus type of insecticide, to which insects have not as yet developed resistance of any significance.

To ensure more effective means of controlling insects, every consideration should be given to methods which may replace, supplement, or improve the commonly used techniques or materials. Indiscriminate spraying, which has probably been a contributory factor in the development of resistance, should be avoided. Every effort should be made to reduce the breeding possibilities of insects by use of environmental sanitation methods. Even in those cases where insecticide control is still effective, the methods of sanitation should be applied. These permanent methods of control should be instituted wherever feasible so that less dependence on insecticides will be necessary. Drainage, filling, impoundments, flushing streams, water-level management in impounded areas, and destruction of aquatic vegetation are measures known to accomplish control under certain conditions. It is strongly felt that community-wide sanitation programmes should be an integral part of all insect-control undertakings.

Habits of personal hygiene and improvement in basic living conditions are the foundations for any long-term programme of lice control.

The use of chemically related insecticides against both the adults and the larvae of the same species should not be carried out simultaneously in the same area, except in cases of emergency.

The use of repellents in disease-vector control is still a largely unexplored field. Adequate research in this field might result in new approaches to the control of insect-borne disease, and it is suggested that research in this direction be undertaken.

Because of the extent of migration of flies, it is likely that attractants will prove most satisfactory when employed in a community-wide programme. It is possible that the use of attractants in permanent bait stations may offer an effective and economical way of controlling flies in some situations. Further research should be undertaken to find materials more effective than molasses, one of the most commonly used attractants.

Insecticides should be used as conservatively as possible, and further exploration should be conducted for biological methods of control. Research into such methods for mosquito control seems warranted. Viruses, bacteria, or protozoan organisms with a selective action against insects might be identified, cultured, and disseminated for controlling mosquitos in the same way that organisms have been disseminated for controlling certain agricultural and forest pests. Flies are known to be attacked by fungi and certain arthropod parasites, and it is possible that research may lead to the discovery of useful organisms for the control of this vector.

The need for fundamental research on insect populations appears to be urgent. The development and use of quantitative methods for estimating population densities is highly desirable.

Testing of new insecticides

Some of the newer insecticides, including the important organic phosphorus group, promise success in the control of insects resistant to the chlorinated hydrocarbon group. It is suggested that a continuous programme of research be initiated to develop these and other types of insecticides or effective combinations of suitable materials. This phase of research should not terminate at the laboratory stage. It should be followed by their controlled use in the field so as to determine in advance whether insects in different parts of the world are capable of developing resistance to them. Only those materials to which insects do not rapidly develop high resistance should be relied upon for practical long-term use. Investigations should also be carried out to determine the most effective manner of using insecticides to avoid or delay the development of resistance.

Toxicity of insecticides to man, and protection of personnel handling them

DDT, BHC, chlordane, dieldrin, and a few other similar compounds, have been extensively used for insect control without any recorded example of acute or chronic poisoning, exclusive of accidents resulting from gross misuse, although many hundreds of field operators have inevitably been exposed to these chemicals. This fact is reassuring in areas where spray control has been, or will be, carried out.

Certain other chemicals such as parathion, used for the control of agricultural pests, have caused fatalities and cases of serious poisoning. However, the number of these accidents has decreased despite increased use of parathion and many related compounds. Experience indicates that the introduction of new chemicals or of old chemicals for new purposes may lead to danger, but this is not necessarily serious or unavoidable.

Accidental poisoning usually results from carelessness. Some carelessness is often inevitable when a poisonous substance is handled by many people. It is the duty of those responsible for insect-control measures involving the use of chemicals to see that the use and distribution of the material is

undertaken only by trained staff using adequate and well designed equipment. Some instruction in simple practical precautions must be given, and facilities for personal cleanliness provided. Arrangements should be made for the prompt and efficient notification and medical treatment of any case of suspected poisoning in insect-control teams.

It is possible that new and unsuspected reactions in man may follow the repeated absorption of a chemical in small quantities. The existence of any such dangers associated with the handling of a newly developed chemical can be recognized earliest by an adequate general medical surveillance of men most exposed to such insecticides.

It is suggested that further research be carried out on methods for determining the quantity of toxic substances in the atmosphere, consideration being given to the international standardization of such methods.

Toxicological studies on new insecticides should be carried out concurrently with biological research, so as to enable their rapid and efficient use in programmes where man is exposed to them.

BASIC PHYSIOLOGICAL RESEARCH REQUIRED ON INSECT RESISTANCE

We are insufficiently informed as to what causes death when insects are exposed to insecticides and as to the biochemical and physiological bases of resistance. It is highly improbable from what has already been observed that any single measure can be expected to provide an overall solution. Consequently, it is of the greatest importance to obtain as prompt and complete a definition as possible of the physiological aspects in each situation where resistance may arise so that counter-efforts may be directed towards specific goals. The likelihood that these goals will differ from one situation to another should also be recognized and accepted.

The areas in which the greatest amount of research appears to be required are the following:

1. General research

(*a*) Expansion of basic research on the physiological functions of normal insects.

(*b*) Analysis of physiological mechanisms of intoxication and death, for all insecticides in widespread use.

(*c*) Development of the necessary micro-analytical methods for determining insecticides and their metabolic derivatives in insect tissues.

(*d*) Identification and detailed analysis of resistance mechanisms, for all cases where resistance occurs.

(*e*) Development of the physiological basis for alternative methods of controlling resistant insects; for example, basic studies of attraction and repellence, and of other factors in behaviour.

2. Specific laboratory research

(*a*) Studies of the manner in which systemic insecticides are metabolized by the insect body to produce toxic products.

(*b*) Studies of how and where DDT is stored in the tissues. Is it excreted? If so, in what form and how?

(*c*) Development of synergists for protection of new and known insecticides against metabolic breakdown.

(*d*) Development of improved insecticides from those groups of compounds (e.g., organic phosphates, pyrethrins, and analogues) resistance to which seems to be less readily developed.

3. Specific field research

A survey should be made, in all areas where adequate laboratory facilities are available, of the ability of available strains of *Musca* to absorb and metabolize DDT, the purpose being to gain an understanding of the relative importance of absorption and metabolism in DDT resistance.

GENETIC ASPECTS OF DEVELOPMENT OF RESISTANCE BY INSECTS TO CHEMICAL INSECTICIDES

The basic genetics of the housefly require full study. The collection of mutants is an essential prerequisite to this. A search of mutant genes of natural populations could give data illustrating genetical differentiation. Since the duration of this basic study cannot be predicted, specific efforts might usefully be directed in the meantime to research on the genetical factors controlling resistance in stocks which have developed high tolerance to a given insecticide through different physiological mechanisms, and on the genetical relation of resistance to different insecticides.

Extensive data are needed on the effect of selection on the development of resistance, and the fate of the genes for the different forms of resistance in natural and laboratory strains not submitted to selective pressure of toxic agents.

The dominance relation between the genetical factors responsible for resistance and for susceptibility should be better understood; in fact, any form of even incomplete dominance of the factors controlling resistance is of great importance for the speed of the development of high tolerance in strains under selective pressure.

All the aspects of resistance should be considered–namely, knockdown, kill, knockdown/kill correlation, and, finally, effect of external factors on the tolerance of selected strains.

Special encouragement and assistance should be given to the continued study of the biology and ecology of resistant and non-resistant strains of insect vectors of disease in various environments.

Research should be expanded to obtain more information about the "normal" insects, the mode of action of insecticides and synergists, and the nature of the resistance mechanism. This may guide chemists in the preparation of more suitable materials.

INTERNATIONAL ACTION AND CO-OPERATION

The participants in the symposium felt that in future work directed to the control of insect vectors of disease it was important that co-ordination of research and development of standard methods should be undertaken at the international level. It was suggested that initially this work might be concentrated on three main objectives:

(1) collection of data on test methods for the detection of resistance in insects of medical importance, with a view to developing and disseminating a set of recommendations on resistance detection;

(2) stimulation of suitable institutions and laboratories in different parts of the world to carry out tests on new insecticides so that development of resistance may be assessed before large-scale operations are undertaken;

(3) action designed to secure worldwide recognition of the significance of the resistance problem with a view to securing the substantial expansion of research required to maintain high standards of vector control throughout the world.

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WHO Publishes Information on Quarantine Measures and Vaccination Requirements

WHO has published, as a supplement to the *Weekly Epidemiological Record*,* a review of quarantine measures and vaccination certificate requirements applied by countries to travellers arriving within their borders. The information gives the situation on 5 March 1954, and is concerned particularly with cholera, yellow fever, and smallpox. Also included is a statement indicating whether specific countries and territories are party to the International Sanitary Regulations. This publication should be of interest to health authorities, to airline and shipping companies, and, in general, to all those concerned with the international traffic of passengers and goods.

* *Wkly epidem. Rec.* 1954, 29, Supplement 1 to No. 9

1953 Poliomyelitis Epidemic in Sweden

A recent number of the *Weekly Epidemiological Record* * reports that the 1953 epidemic of poliomyelitis in Sweden " appears to be the worst recorded in the country ". The following statistics are given : " Provisional totals of paralytic cases reached 3,029 (as against 2,596 in 1936, the highest figure recorded since 1919). The provisional number of all cases (including paralytic cases), reached 5,084, against 3,112 in 1936 and 2,716 in 1944. Stockholm town and department were the most affected areas, with 30.5 per cent of the cases reported during the year. The peak of the epidemic was reached in October with 764 cases; during the month of December, the total fell from 856 to 352."

* *Wkly epidem. Rec.* 1954, 29, 46

Reports of Expert Groups

POLIOMYELITIS

Poliomyelitis, a health problem of increasing importance, is the subject of a WHO expert committee report which aims to give "an account of present concepts of the essential nature of this disease, with a review of recent advances that have been made . . . , especially [in] methods of diagnosis and possibilities of prevention".[1] There follows an adaptation of the summary and conclusions of this report by the Expert Committee on Poliomyelitis.

Epidemiology

Poliomyelitis is an infection found in all parts of the world; paralytic cases have been reported from all continents and many islands. It is of interest that the paralytic form of the disease, which before the Second World War was thought to be rare in the tropics, is being increasingly recognized in such areas.

Both climate and season exert an effect on the epidemiological behaviour of the disease : in temperate regions of both hemispheres, poliomyelitis is more prevalent in summer and autumn than in winter, while in tropical areas cases occur more uniformly throughout the year. The reason for this phenomenon is not yet known.

It is believed that poor sanitary conditions greatly facilitate the spread of the poliomyelitis virus. Flies have been incriminated as potential sources of infection; but, though this may be true in areas where they have free access to faecal matter, there is no evidence that they play an essential role. In particular, flies do not appear to become actively infected with the virus and therefore do not serve as reservoirs of infection, but merely as mechanical carriers.

Socio-economic factors, particularly crowding, affect the age distribution of the disease; for example, children are apt to be infected at an earlier age in urban communities than in rural areas. When the infection does strike in the older age-groups, however, the results tend to be much more severe.

Clinical features

"The manifestations of infection by the virus of poliomyelitis range from an inapparent infection to a severe paralytic illness. In some countries, the only form of illness regarded as indicative of infection is an acute febrile disease usually followed by paralysis." The report stresses that paralysis is actually "an infrequent complication of poliomyelitis infection, and that most persons who become infected either show no symptoms or else develop a milder illness, which may or may not show evidence of involvement of the central nervous system". While the paralytic form of the disease is readily diagnosed, it is difficult to make a diagnosis of the non-paralytic form since many other agents cause an aseptic meningitis that can be differentiated from non-paralytic poliomyelitis only by elaborate and time-consuming laboratory tests.

It is interesting from a clinical standpoint that factors other than the virus itself may predispose to, or precipitate, the development of paralysis—for example, genetic and hormonal factors, overexertion, and specific trauma, especially tonsillectomy and certain intramuscular injections.

[1] *Wld Hlth Org. techn. Rep. Ser.* 1954, 81. 68 pages. Price : 3/6, $0.50, or Sw. fr. 2.—. Published in English and in French.

Portals of entry and distribution of virus in the body

Laboratory and epidemiological evidence indicates that poliomyelitis is a highly infectious disease spread by intimate association with infected persons. It is probable that the virus is actually transferred directly or indirectly by means of pharyngeal excretions and faecal matter. It used to be believed that the disease was spread mainly by respiratory droplets, but the present concept is one of transmission chiefly by faecal contamination, as occurs in intestinal infections such as bacillary dysentery.

It is now thought that the portal of entry is usually the mouth and that the primary site of infection is in the pharynx and the rest of the alimentary tract. How it spreads from the primary site to the central nervous system is not completely clear, but the recent finding of virus in the blood-stream, both in man and in monkeys and chimpanzees, has suggested that the virus may reach the central nervous system by the blood.

During the incubation period, the virus appears more or less simultaneously in the throat, the blood-stream, and the intestinal tract. Virus can subsequently be demonstrated in the throat for about ten days and in the faeces for as long as 12 weeks, although about half the patients no longer excrete virus by three weeks after the onset of the disease. The earlier concept that the poliomyelitis was mainly neurotropic is no longer tenable; the virus evidently has an affinity for the alimentary tract and, perhaps, for other tissues.

Immunity in poliomyelitis

The best index of immunity to poliomyelitis may be obtained from a study of distribution of the disease in various age-groups, particularly if correlated with results of serum antibody determinations. Experience indicates that most primary infections are acquired in childhood.

It is still uncertain whether solid and durable immunity is conferred by a single infection or whether it is dependent upon repeated exposure. Evidence suggests, however, that a more durable immunity is produced by repeated exposure, such as occurs in areas of high environmental pollution.

There are three known types of poliomyelitis virus : Type I (Brunhilde), Type 2 (Lansing), and Type 3 (Leon). It is becoming increasingly evident that the presence of Type 2 antibody in the general population, as determined by serum antibody surveys, runs parallel with that of antibodies for the other two types of virus, so that determination of Type 2 antibody has been used as an indication of experience with the other types.

From experiments on primates it appears that the level of serum antibody plays a role in determining resistance to infection, but observations are as yet insufficient to establish a similar correlation with respect to man. While circulating antibody does not necessarily prevent alimentary infection in man, it may well serve to interfere with spread of virus to the central nervous system, and therefore with the production of paralysis.

Advances in laboratory techniques in poliomyelitis

The study of poliomyelitis has been revolutionized by the introduction of the method of cultivating the virus on tissue-cultures, which is easier and more accurate than the older methods in which monkeys were required. This tissue-culture technique can facilitate the study of the basic immunological behaviour of the disease as well as be used for the isolation and antigenic typing of viruses. It also offers possibilities for the development of a vaccine.

In parts of the world where monkeys can easily be obtained, isolation of poliomyelitis

virus by the well-tried method of monkey inoculation will continue to serve essentially the same purpose as the new technique. The report therefore includes technical appendices giving precise details of the more familiar techniques; the tissue-culture method is not described in detail because standard procedures cannot be laid down at the present stage of rapid progress. However, a bibliography is provided which indicates where further information may be found.

There is still great need for a rapid serological test that might assist laboratory diagnosis in the first few days of illness. Progress in the development of a complement-fixation test is encouraging, but the practical stage has not yet been reached.

Control measures

Standard methods for the control of infectious diseases have been of little avail in poliomyelitis. One of the reasons for the apparent failure of isolation and quarantine measures to check the spread of infection may lie in the fact that for every case of paralysis there may be many of mild or inapparent infection. Cases considered to be poliomyelitis should be notified, paralytic and non-paralytic forms being recorded separately.

Virological studies of certain communities have shown that the virus is found mainly in the intimate associates of the paralytic case. It appears possible, therefore, that some reduction in the number of cases of poliomyelitis might be achieved by vigorous quarantine and hygienic measures directed at the first recognized cases. It is difficult to make a firm recommendation as to the length of time a patient should be isolated because it is not known when the individual case becomes free from infection. However, there would seem to be some value in the practice of isolating cases and quarantining contacts for three weeks. Under conditions in which the virus may spread readily, such as in nursery schools and residential nurseries, it may also be desirable to exclude convalescent poliomyelitis cases for several weeks.

It is probable that *during epidemics* the incidence of paralytic cases can be reduced if efforts are made to avoid conditions known to predispose to, or precipitate, paralysis—e.g., overexertion, tonsillectomy, and the administration of intramuscular injections of adsorbed combined diphtheria-pertussis vaccine and of heavy metals, such as arsenic, mercury, and bismuth. Further, all febrile illnesses occurring at times of endemic poliomyelitis should be treated with caution.

At the present time, more hope for the control of poliomyelitis is being placed in the development of methods of immunization than in quarantine measures. Experiments in primates have shown that paralysis can be prevented passively by the inoculation of gamma globulin. It appears from these experiments that low levels of circulating antibody serve to protect against infection by oral administration of virus. Limited success has been achieved with gamma globulin in the USA, where it has been widely used in an attempt to control the incidence of paralysis. Gamma globulin is in very short supply in almost all countries and should therefore be administered only to selected groups. Even so, very considerable wastage is inevitable since such a small proportion of exposed persons develops paralysis. However, its use is recommended for close contacts of cases, contacts in hospital wards and nursing schools, individuals entering an infected institution, newborn infants of mothers developing poliomyelitis, pregnant women exposed to infection, and individuals who must submit to a tonsillectomy during a poliomyelitis epidemic.

Research is now being undertaken on a more promising method of control of poliomyelitis by active immunization or vaccination. Attempts are being made to discover

avirulent strains or to attenuate virulent strains of poliomyelitis virus, so that they may be safely administered, by mouth, in the hope that natural infection and its resulting immunity will thereby be simulated. Efforts are also being directed towards the development of a vaccine containing chemically inactivated virus prepared from tissue cultures. This work is still in the experimental stage, and there is as yet no direct evidence that such preparations can induce resistance to poliomyelitis in man, although it is known that antibody develops following inoculation.

RABIES

The second report of the WHO Expert Committee on Rabies [1] reviews the knowledge gained in the past three years on various aspects of rabies control, particularly on antirabies hyperimmune serum and on living virus vaccine cultivated in the chicken embryo. It also reports the results of WHO-sponsored field trials of the latter in mass vaccination of dogs in Israel and Malaya.

New developments in antirabies vaccines

Experimental work and immunization campaigns have shown that vaccine prepared from chicken-embryo adapted Flury strain, at the level of 40-50th egg passage, is of high immunogenic potency for dogs; it has also been found satisfactory for the immunization of cats. At about the 180th egg passage, the Flury strain became non-virulent for adult mice and rabbits injected intracerebrally; preliminary experiments also demonstrated that at this stage it retained its antigenicity for dogs and cattle, and was entirely devoid of pathogenicity for the latter when given intramuscularly.

Another chicken-embryo modified strain of rabies virus, the Kelev strain, has been developed and has been found devoid of pathogenic properties for intracerebrally injected adult mice, rabbits, hamsters, and guinea-pigs, and, at the same time, antigenic for dogs and cattle. To date, far more work has been done with the Flury strain than with the Kelev strain.

These new developments may lead to wider application of such vaccines in rabies prophylaxis. It is emphasized, however, that only certain strains of rabies virus cultivated in the chicken embryo can be considered immunogenic and safe for vaccination.

At present, chicken-embryo vaccines are not recommended for human treatment.

The problem of the removal of the paralysis-producing factor from nervous tissue vaccines has not yet been solved, and research on this subject should be encouraged.

The report stresses the importance of carrying out adequate potency tests on nervous tissue vaccines, recommending the desirability of continuing quantitative evaluation of potency of all batches of vaccine produced in any laboratory. Some test should be carried out on every batch of vaccine, and laboratories unable to do the quantitative tests should employ the " modified Habel test " for routine testing; a more complete quantitative test should, however, be performed as a check every six months, or at least once a year.

Every batch of chicken-embryo vaccine should be submitted to the guinea-pig

[1] *Wld. Hlth Org. techn. Rep. Ser.* 1954, 82. 26 pages. Price : 1/9, $0.25, or Sw. fr. 1.—. Published in English and in French.

potency tests developed especially for such types of vaccine.

Antirabies hyperimmune serum

Accumulating experimental evidence of the efficacy of antirabies hyperimmune serum prophylaxis encourages its use in all human cases of severe exposure, or even in cases other than those involving severe exposure, depending on the circumstances. Antirabies serum treatment should be given within the shortest possible time after exposure : under laboratory conditions, the best results are obtained only when the serum is administered within 72 hours.

Hyperimmune serum produced in horses appears to give rise to serum sickness less frequently than that produced in sheep. With all types of antisera, the patient should be tested for sensitivity before serum treatment is administered and should be " desensitized " if necessary.

Serum neutralization tests on non-exposed individuals

Seven laboratories in various countries have undertaken a study of the effectiveness of hyperimmune serum, with and without subsequent administration of vaccine, in normal test subjects who have not been exposed to rabies. A summary of the results to date in this WHO-co-ordinated study is included in the report, and the following provisional conclusion is reached : " Although the presence of serum antibody in human beings during or after any antirabies treatment is only indirect evidence of immunity to rabies, it is still the only available experimental evaluation that can be carried out in man. For maintenance of continuous antibody over a period of time, the combined use of a dose of hyperimmune serum followed by 14 daily doses of phenolized vaccine would appear to be the best procedure in the light of these experiments." This investigation is being continued.

Post-exposure treatment of man

The specific treatment which should be given under different circumstances is outlined in a table in the report. With regard to local treatment of wounds, immediate and thorough cleansing with soap or detergent solution is recommended, this procedure to be followed by the use of strong mineral acids, such as nitric acid, for deep wounds which cannot be cleansed efficiently by the former means. Application of ordinary antiseptics and local or parenteral use of antibiotics have no prophylactic value against the rabies virus, though they may be used after local treatment to combat bacterial infection.

Rabies control in animals

There are three basic principles in a rabies-control programme : (1) elimination of stray dogs, (2) vaccination of dogs, and (3) control of wild-animal vectors. The first of these is dependent upon the registration or licensing of the " canine population ". The second, vaccination, is best accomplished by use of the chicken-embryo vaccine (Flury strain), which confers excellent immunity in dogs for at least three years after a single intramuscular inoculation. In areas where this vaccine is not available or is impractical, single injections of nervous tissue vaccine may be given, though the immunity is less (" good" for one year, with significant protection after three years) and the paralytic factor represents a hazard. All vaccines used for immunization should have passed an adequate potency test.

Control of wildlife vectors calls for " well-organized campaigns for the reduction of excessive numbers of wild vector population ...". It is noted in the report that

vampire bats continue to be a source of rabies infection in Mexico, Central America, and South America, though progress has been realized through eradication schemes which employ dynamiting, gassing, and shooting of vampire bats in their diurnal resting places. Recently, rabid insectivorous bats have attacked man in the States of Florida and Pennsylvania, USA, and this finding introduces a new and disturbing factor into the epizootiology of rabies.

It is recommended that animals bitten by animals known to be rabid be immediately destroyed. However, certain alternatives are suggested for cases in which the owners are unwilling to destroy exposed animals. Also suggested are specific measures to be enforced by countries to prevent the importation of rabies through the passage of animals from one country to another.

Diagnosis

" The attack against an infectious disease like rabies must necessarily begin with adequate facilities for detecting and measuring the problem as quickly and accurately as possible." The report calls attention to the importance of rapid, accurate, and economical laboratory procedures. It stresses particularly the necessity for performing animal inoculation tests for the isolation of virus from suspected brain tissue in Negri negative specimens. Surveys of large numbers of specimens submitted for diagnosis showed that 10%-15% of the cases proved positive by mouse inoculation had been missed by direct microscopic examination for Negri bodies. The mouse inoculation test has been given wider applicability in recent years than was possible formerly, thanks to the use of antibiotics, which suppress contaminating bacteria without destroying the virus present in decomposed tissue specimens. Antibiotics have also made it possible to confirm antemortem diagnosis of human rabies by isolation of virus from saliva.

Laboratory techniques in rabies are described in detail in a monograph soon to be published by WHO.[2]

Field trials of chicken-embryo vaccine in dogs

In an annex to the report are presented the results of WHO-sponsored field trials and demonstrations of rabies-control programmes based upon mass vaccination of dogs with chicken-embryo vaccine.

The first such trial was undertaken in Israel, where, in 1949, 194 cases of rabies in animals had been reported. From October 1950 to June 1953, 30,000 dogs were vaccinated with chicken-embryo vaccine. The reduction in incidence of rabies as a result of this vaccination campaign was impressive : in spite of the continued prevalence of the disease in neighbouring countries, only three cases of animal rabies were observed in the first six months of 1953. The report notes that " although ancillary measures such as registration of dogs, good reporting, adequate diagnostic facilities, elimination of stray animals, and destruction of wildlife were all applied during the years preceding the campaign, it was not until mass vaccination of dogs was introduced that the disease was brought under control ".

A systematic rabies-control programme was also carried out in Malaya, where the disease had been a problem for many years and had reached epizootic proportions by the middle of 1952. Compulsory vaccination, stray-dog elimination, and well-organized educational campaigns were all part of this effort, which produced excellent results. No cases of rabies in man or in animals were reported in Malaya in 1953 up to the end of October, when the latest information was received.

[2] World Health Organization (1954) *Laboratory techniques in rabies*, Geneva (*World Health Organization : Monograph Series* No. 23) (in press)

RHEUMATIC DISEASES

Chronic rheumatic diseases have been somewhat neglected from both a medical and a research viewpoint, despite their social and economic significance as causes of long-term disability. At present there is lack of knowledge concerning the etiology of this group of diseases, and treatment is therefore still largely palliative and prevention impossible.

A review from a public-health standpoint of the chronic rheumatic diseases of articular and non-articular types is presented in a recent Technical Report prepared by a WHO expert committee on this subject.[1] It is noted in the report that, as an international health problem, the rheumatic diseases must of necessity be considered less important in some countries than illnesses of an infective or parasitic nature which are amenable to specific measures of control.

Nomenclature and classification

Both a nomenclature and a classification are needed for the group of diseases termed "rheumatic". The task of formulating a nomenclature has been undertaken by a special committee of the International League against Rheumatism. As for a classification, any which might be made would have to be considered provisional, since there are as yet too many unknowns in the etiology and pathogenesis of rheumatic diseases.

The following general statement is made in the report :

> "Rheumatic diseases affect the locomotor system, in which they are important causes of pain, dysfunction, and anatomical change. The most important link between them is now considered to be that they are all diseases peculiar to the connective tissue and that, as such, they all show reactions peculiar to this tissue and especially of its collagen element. It should be emphasized that, although the etiology of the different rheumatic diseases is probably extremely diverse, these connective tissue reactions are common to all of them; in this connexion it should be noted that not only connective tissue of the locomotor system, but also to some extent that of the viscera, the nervous system, the haematopoetic system, the skin, etc. may be affected by these diseases."

In an appendix to the report is a list of the diseases commonly accepted as rheumatic and of other diseases presenting rheumatic features.

Incidence and prevalence

Existing data on the incidence and prevalence of chronic rheumatic diseases are not adequate for any of the purposes for which morbidity statistics are commonly used. Four methods have been used to obtain such data as do exist : notification, analysis of medical sickness records (such as health insurance forms), analysis of hospital records, and sickness surveys. Of these four, only the last is considered likely to yield data which would enable statisticians to make satisfactory studies of the chronic rheumatic diseases. To be really useful, such surveys would require considerable medical and technical organization, and the home-visiting would have to be done by doctors with special training and interest in the rheumatic diseases and with facilities available for making and checking diagnoses.

Uniformity in diagnostic headings would aid in making the data from such surveys comparable from country to country; and, for this purpose, the following are suggested in the report :

Rheumatic fever
Rheumatoid arthritis (and allied conditions such as ankylosing spondylitis, Still's disease, etc.)

[1] *Wld Hlth Org. techn. Rep. Ser.* 1954, **78**. 25 pages. Price : 1/9, $0.25, or Sw. fr. 1.—. Published in English and in French.

Osteoarthritis (arthrosis)—including the spine
Other forms of arthritis—infective and traumatic
Gout
Lesions of the intervertebral discs
Non-articular rheumatism (" fibrositis ")—in various parts of the body
" Rheumatism " unspecified

A summary of statistical studies which have been made in several countries during or since the Second World War is included in an appendix to the report. Though these studies are of limited value, they give some idea of the prevalence and incidence of the rheumatic diseases. For example, in a survey made of a " probability " sample of the population of the USA in 1951, the main conclusion reached was that there were about ten million persons over the age of 14 years (i.e., about one-tenth of the total population over this age) who believed they were suffering from either " arthritis " or " rheumatism ". It was estimated that about six million of these ten million persons had been told by a doctor that their complaints were due to one or another of these two conditions.

A study of rheumatic diseases as causes of disablement and of long- and short-term illnesses in relation to the social security arrangements of the metropolitan Paris area revealed that, in about 10% of 50,000 disabled persons, the cause of the disablement was a rheumatic disease, 40% of these 5,000 persons being disabled by the cardiac sequelae of rheumatic fever. About 6% of 50,000 cases of long-term illness (i.e., longer than six months but less than three years) were also attributed to rheumatic diseases, excluding cardiopathies due to rheumatic fever.

In Sweden, an inquiry made in 1943 showed that during the year 2.5 per 1,000 of the population had sought medical care for rheumatoid arthritis; 1.7 per 1,000, for osteoarthritis; and 4.0 per 1,000, for sciatica and fibrositis. The data also revealed that the total number of sufferers from rheumatic diseases (including rheumatic fever) that had received medical care was about 90,000. During the year, approximately 2,100 hospital beds were occupied by rheumatic patients, but it was estimated that the total number of beds needed for treatment of such patients was about 5,000, or at least 7 per 10,000 of the population.

No definite conclusions about the etiology and pathogenesis of rheumatic diseases can be drawn from the studies made thus far. However, certain generalities emerge concerning age and sex incidence : in rheumatoid arthritis, there is a higher incidence in the middle age-groups of the female sex than in the male; there are also differences in the sex incidence of osteoarthritis, in which incidence appears to rise steadily with age; and some studies indicate that among men laborious occupations are associated with an earlier onset of some chronic diseases with rheumatic features (e.g., lesions of the intervertebral disc) than is the case among the general population.

Prevention, control, and treatment

Specific preventive measures against the rheumatic diseases are as yet not feasible, except possibly against rheumatic fever, in which the streptococcal infection is probably an etiological factor which might be countered by the use of antibiotics and of sulfonamides.

Early recognition and prompt treatment are very important. Treatment methods are largely empirical but may nevertheless yield good results. The most commonly used methods are general medical measures, including the administration of special drugs such as gold; physiotherapy; and orthopaedic techniques, including splinting, manipulation, and operative procedures. The report states that the use of active steroid and other hormones, which has recently been tried, can be of value in carefully selected cases, but must be considered as still largely in the experimental stage.

It is essential that adequate treatment facilities and hospital beds be made available for patients suffering from rheumatic diseases; that general practitioners be better informed concerning the management of rheumatic cases; that the services of specialists in these diseases be at the disposal of patients and of general practitioners; and that research on the rheumatic diseases be encouraged. Attention must also be given to limitation of disability, through patient education as well as therapeutic measures; to rehabilitation of those disabled by rheumatic diseases; and to health education of the public, which is needed to correct the erroneous belief that these diseases are incurable, practically untreatable, and usually disabling.

ALCOHOL AS A DRUG

Alcoholism as a psychiatric and social problem has been the subject of two WHO Technical Reports, prepared by the Alcoholism Subcommittee of the Expert Committee on Mental Health.[1] A related subject, alcohol as a drug, is dealt with in a new report, which summarizes the discussions of the Expert Committee on Alcohol.[2] This addition to WHO literature on a serious public-health problem is concerned with the physiological, pharmacological, and biochemical properties of alcohol and with its effects on the human organism.

Metabolism of alcohol

One section of the report is devoted to the metabolism of alcohol, considered largely from the viewpoint of the results of excessive intake as observed among alcoholics. A regular daily consumption of 400 g, or even more, of alcohol has been reported, and this raises the problem of whether present knowledge of the metabolism of alcohol is capable of furnishing a reasonable explanation of the disposal of such an amount.

A small percentage of alcohol is directly excreted by the kidneys, lungs, and sweat glands, but the major portion undergoes oxidation, principally in the liver. Whether or not the rate of oxidation is greatly increased in conditions of excessive intake of alcohol is a question which requires further study. Experiments carried out thus far have shown that, while a certain degree of dependence of the oxidation rate upon blood-alcohol concentration probably exists, it is not very marked within the range of blood-alcohol levels up to 0.2%. The average rate of disposal of alcohol, as determined by study of blood-alcohol curves, is generally stated to be not much greater than 100 mg/kg of body-weight/hour, though disposal rates of about double this amount have been recorded.

It is possible that some part of large amounts of alcohol may undergo partial oxidation and that the acetate resulting therefrom may enter into synthetic reactions leading to the formation of deposits of fat. The disappearance from the body of some part of the ingested alcohol may be accounted for by absorption into food material present in the stomach. Investigation of such possibilities might lead to explanations of some of the unknown factors concerning the metabolic processes involved when excessive amounts of alcohol are ingested.

Alcohol consumption as an element in nutrition is also considered in the report. Of

[1] *Wld Hlth Org. techn. Rep. Ser.* 1951, 42; 1952, 48

[2] *Wld Hlth Org. techn. Rep. Ser.* 1954, 84. 16 pages. Price: 1/9, $0.25, or Sw. fr. 1.—. Published in English and in French.

the 7.1 calories available from the total oxidation of 1 g of alcohol, approximately 2.6 are liberated during the first stages of oxidation to acetate; the remainder should be available for muscular energy. The calories provided by alcohol should therefore be included in the tabulation of energy value of diets, using the value of 7.1 calories per gram of alcohol. However, in evaluating the average diet of a population, account must be taken of the fact that the consumption of alcohol is distributed in a very irregular fashion; in some countries, for example, as much as 37% of the alcohol consumption is accounted for by 2% of the population. Thus, while it is recommended that, in analysing the composition of diets, the amount of alcohol should be placed side by side with protein, carbohydrate, and fat, attention in any nutritional survey must be paid to the distribution of alcohol consumption throughout the population under study. It should be noted, too, that, since alcohol consumption is generally compensated by a decreased intake of calories from other sources, there is a danger that the habitual use of large amounts of alcohol may lead to deficiency diseases caused by a low intake of protective foodstuffs.

Position of alcohol as a drug

It is concluded in the report that alcohol can be classified neither as an addiction-producing nor as a habit-forming drug, but that it must be placed in a category of its own, intermediate between these two groups. In sum,

> " Alcohol must be considered a drug whose pharmacological action is intermediate in kind and degree between addiction-producing and habit-forming drugs, so that compulsive craving and dependence can develop in those individuals whose make-up leads them to seek and find an escape in alcohol. With this substance, the personal make-up is the determining factor, but the pharmacological action plays a significant role. Damage to the individual may develop, but does so in only a minority of users. The social damage that arises extends, however, beyond these individuals themselves."

Tolerance to alcohol

It is necessary to make a distinction between the use of the term " tolerance " in connexion with addiction-producing drugs of the morphine type and that required for consideration of the problems associated with the use of alcoholic beverages. Tolerance to alcohol is defined as " the capacity of the organism to function with alcohol in the blood without measurable deterioration in nervous function ". Experiments upon animals and man have shown that it is possible to measure this tolerance in terms of the concentration of alcohol in the blood at which a demonstrable effect on the performance of a given test of nervous function first becomes apparent; this " threshold " of alcohol concentration in the blood is characteristic of the individual and of the particular test employed.

To produce the same effects, a higher blood-alcohol level is required in habitual heavy drinkers than in moderate drinkers and abstainers. The change in resistance to the drug which results from habitual intake is termed " acquired increase of tolerance "; that it is actually acquired has been demonstrated by its disappearance after a period of abstinence. It is emphasized that the acquired increase of tolerance to alcohol is of a lower order of magnitude than the corresponding phenomenon which may occur with addiction-producing drugs of the morphine type.

Very little is known about the underlying mechanism of acquired increase of tolerance to alcohol in the habituated organism. It is suggested in the report that research should be undertaken to determine the factors involved, and that such research might be greatly facilitated if it were possible to adopt

standard tests which would enable the results obtained by different workers to be compared.

Alcohol and road accidents

A definite answer to the question as to whether or not alcohol is the cause of a road accident can seldom, if ever, be given. Means are needed to make possible a decision concerning the extent to which the driving abilities of the person involved were definitely impaired because of his consumption of alcohol.

On the basis of laboratory investigations made in recent years, the results of statistically designed practical tests on drivers, air pilots, etc., and the statistical evidence from the few adequate studies existing on alcohol and road accidents, it may be inferred that " at a blood-alcohol concentration of about 0.05‰, a statistically significant impairment of performance is observed in more than half the cases examined ". Compared to the tests used in experimental studies such as those upon which this statement is based, the ordinary clinical tests used in forensic practice are rather crude and may lead to faulty conclusions as to the condition of the person examined. Clinical methods cannot be relied on as the only means of deciding whether a person is under the influence of alcohol. Certain chemical methods have greater validity, particularly the method of Widmark for the micro-determination of alcohol in the blood. Less reliable is the determination of alcohol in the breath, though this method, when carried out with appropriate precautions, may provide an acceptable substitute if blood-alcohol determinations cannot be made. Determination of alcohol in the urine is of limited value and should be used only as a supplement to blood-alcohol determination.

The widespread consumption of alcoholic beverages and the increasing complexity of traffic make it necessary to find an acceptable solution to the problem of alcohol and traffic. This solution will have to be reached on a national level, since attitudes towards alcohol, intensity of road traffic, and other relevant factors differ widely from country to country.

SANITATION IN RURAL AREAS AND SMALL COMMUNITIES [1]

The third report of the WHO Expert Committee on Environmental Sanitation [2] is concerned chiefly with the problems of sanitation in rural areas and small communities. Environmental sanitation is interpreted in this report as " the control of all those factors in man's physical environment that exercise, or may exercise, a deleterious effect on his physical, mental, or social well-being ". The terms " rural areas " and " small communities " refer to " areas where agriculture is the chief, or even the sole, industry, and where there is a lack of diversity of skill and of organized community services, or to areas where the dwellings are scattered or are in small groups, which dispersion creates difficulty in the provision of organized community services such as water-supply, excreta disposal, control of vectors of disease, and similar services at a cost suited to the economic level of the persons concerned ".

It is emphasized in the report that, although sanitation problems differ widely from place to place, the basic needs are the same " in all areas and among all peoples ". Improve-

[1] For further information on this subject, see *Chron. Wld Hlth Org.* 1954, **8**, 13.

[2] *Wld Hlth Org. techn. Rep. Ser.* 1954, 77. 25 pages. Price: 1/9, $0.25, or Sw. fr. 1.—. Published in English and in French.

ments in environmental sanitation go apace with general economic and social development; and, in areas which are considered less advanced, " the prime need is for some organized movement to stimulate initial action . . . ".

There is ample evidence of the relationship of proper sanitation to health. It has been shown, for instance, that the death-rate among infants in the age-group 1-4 years may be from 30 to 40 times higher in countries with unsatisfactory sanitary conditions than in countries with good environmental sanitation.[3] Amelioration of sanitary conditions results in reduced incidence of diseases transmitted by living vectors or associated with contaminated water or lack of facilities for excreta disposal.

Attention is called in the report to the economic benefits that may accrue from sanitary improvements. For example,

1. The provision of organized sanitary facilities, such as water-supply, leads to a considerable saving of time and labour, which should become available for productive work in the rural economy.

2. Improvements in environmental sanitation contribute to an increase in the normal expectation of life, which means that a larger proportion of the population is in the productive age-groups.

3. The reduced incidence of disease which results from improved sanitation in turn reduces the costs involved in the treatment of disease and in the man-days lost through illness.

4. Successful control of diseases such as malaria, which are dependent on environmental factors, increases the manpower available for agriculture and therefore contributes to increased production of food.

The report describes present sanitary conditions in underdeveloped countries, in many of which more than 80% of the people live in rural areas and small communities. Among the common conditions which constitute serious health hazards are inadequate and contaminated water-supplies; lack of facilities for the proper disposal of excreta, garbage, and other refuse, with accompanying opportunities for fly-breeding and rodent infestation; inadequate housing and overcrowding; and diseases of animals communicable to man. The basic steps in improving the environment are provision of adequate supplies of safe drinking water and of facilities for the safe disposal of human excreta; next in line would be the control of the insect and animal vectors of disease where they are a serious health problem.

The administrative organization of rural sanitation programmes, basic principles of good design in sanitary facilities and equipment, personnel requirements for sanitation work and the training of such personnel, laboratory services necessary for sanitary improvements, and research, investigations, and technical developments are all considered in the report. The need for studies of the following types is stressed :

" (*a*) Basic research in the development of new methods of excreta disposal and of composting by non-traditional means; in the biology and physiology of insects with a view to the more rational development and use of insecticides; in food preservation and storage; in non-traditional methods for the disinfection of water; on the influence of housing and industry on human physiology; and in the development of new methods of obtaining water, such as cloud-seeding, the electrodialysis of brackish water, and the distillation of saline water through the use of solar energy or of conventional power sources;

(*b*) Investigation into the availability and distribution of material resources; the appraisal of local sanitation problems in an attempt to find logical and economical solutions, utilizing, as far as possible, local resources; investigation of non-traditional building materials;

(*c*) The development of new uses for sanitary wastes, particularly in the fields of agriculture and fisheries; the development of field tests for the control

[3] United Nations, Department of Economic Affairs (1952) *Demographic yearbook 1952*, New York

of field operations; the adaptation of techniques, apparatus, and equipment to suit local conditions;

(*d*) An accurate method of appraisal of the social, economic, and physical effects of environmental sanitation in a controlled area. Although the beneficial effects of environmental sanitation are usually obvious, a quantitative measure of these effects would be valuable."

Political, sociological, racial, and religious factors often present " a serious obstacle to any form of organization of community health services ", particularly in less advanced areas. For this reason, health education must be an essential part of any programme to improve environmental sanitation. As pointed out in the report,

" In the final analysis, a satisfactory environment for the peoples in underdeveloped rural areas will, to a large extent, depend upon the understanding, attitude, and action of the people themselves. This is especially true with regard to water-supplies and excreta disposal. In reality, it is unlikely in most of these areas that outside assistance can provide more than guidance, technical aid, and perhaps arrangements for some material resources."

Review of WHO Publications

A BASIC WORK ON PLAGUE

Plague is a disease which is regressing but which has not been completely eradicated. It still persists in an endemic state in many parts of the world. Moreover, the steppes, prairies, and forests of Africa, America, and Asia shelter more than two hundred species of wild rodents liable to infection which may harbour fleas bearing the plague bacillus. This potential source of infection, the extent of which is difficult to evaluate, represents a threat which cannot be eliminated in the near future. Plague thus remains a matter of concern for the health services of many countries.

A recent WHO monograph entitled *Plague*[1] reveals the extent of the problem at the present time and the means available today to limit its seriousness. The author, Dr. R. Pollitzer, has devoted a major part of his career to the study and control of plague. He has brought together in this volume, which is both scholarly and practical, the essential scientific knowledge on the subject and the fruits of his own experience in the field as well as in the laboratory. Clinicians, biologists, public-health workers, and epidemiologists will find this monograph a practical guide and a source of information unique in modern literature on the subject of plague.

After a chapter on the history of plague pandemics and on the present distribution of the disease throughout the world, the author considers, in nine chapters, the relevant scientific accomplishments of the 20th century, particularly the recent methods for the treatment and control of this disease, which has been the terror of mankind since the dawn of history. The plague bacillus—its morphological and biological variations; the immunology of plague—the virulence of the bacillus, the antigenic fractions, the mechanism of immunization, vaccines, serums, and phages; the pathology of the disease—in the experimental animal and in man; methods of laboratory diagnosis; the hosts of the infection—domestic and wild rodents; the vectors—fleas and other arthropods; clinical aspects of human plague, bubonic and pneumonic—including the therapeutic role of

[1] Pollitzer, R. (1954) *Plague*, Geneva (*World Health Organization: Monograph Series* No. 22). 698 pages, bibliographies, 79 illustrations (including 40 original drawings, 2 folding maps, and 2 coloured plates). Price : £3 5s., $10.00, or Sw. fr. 40.— (clothbound); or £3, $9.00, or Sw. fr. 36.— (paperbound).

antibiotics and sulfonamides; the epidemiology of plague—its seasonal variations and its periodicity; plague control by elimination of rats and fleas; prevention by treatment of contacts, vaccination, and international quarantine measures : these are among the many subjects discussed. Documentation is given in the form of an extensive bibliography at the end of each chapter. Numerous illustrations, most of them never before published—such as those which accompany the key for identifying the species of fleas most important in the transmission of plague—add to the interest of this volume, which may become the authoritative work on its subject.

MORTALITY FROM TRANSPORT ACCIDENTS

" It is common knowledge that the traffic problem is becoming very acute in all countries by reason of the rapid multiplication of means of transport and the need to establish regulations and conditions which will help to reduce the public health risk." Although transport accidents are not as significant a cause of death in most countries as are cancer, heart disease, tuberculosis, or the infectious diseases as a whole, they are among " the most important causes of death at certain ages ". These statements are substantiated by statistical data, from 15 countries, that have recently been published in the WHO *Epidemiological and Vital Statistics Report*.[1]

Mortality statistics for 22 types of transport accident are presented under six main headings : (1) railway accidents; (2) motor vehicle traffic accidents (including collisions with trains, pedestrians, cyclists, and motorcyclists and accidents without collisions, etc.); (3) motor vehicle non-traffic accidents; (4) other road vehicle accidents; (5) water transport accidents; and (6) aircraft accidents. The deaths are classified according to sex and to age.

A comparison between the death-rate from transport accidents and that from diseases and other causes of death shows that, in a number of countries, the former ranks with tuberculosis as a cause of death, especially among men. The number of deaths from transport accidents increases with age, as is the case for other causes of death; men are more often victims than women.

Most striking is the fact that, among the young, accidents are one of the more significant causes of death, as table I indicates.

TABLE I. PERCENTAGE, BY SEX, OF GENERAL MORTALITY IN CERTAIN AGE-GROUPS REPRESENTED BY DEATHS CAUSED BY TRANSPORT ACCIDENTS

Country	*Males, 15-24 years*	*Females, 5-14 years*
New Zealand	43.2	10.1
Canada	34.2	18.0
U.S.A.	34.1	11.7
South Africa (Europeans)	30.8	7.1
Denmark	29.7	16.5
England and Wales	27.7	9.5
Germany, Federal Republic	23.1	14.7
Switzerland	21.1	9.3
Netherlands	19.7	17.1
Scotland	16.9	14.9
Italy	12.3	4.2

Motor vehicle accidents rank first as causes of death, with railway accidents, road accidents caused by non-motor vehicles,

[1] *Epidem. vital Statist. Rep.* 1953 ,6, 257

water transport accidents, and aircraft accidents next, in that order. Victims of railway accidents are mostly men of mature years and are often railroad workers. Water transport accidents also take more victims among men than among women, fishing and sports being responsible for most of the deaths. In Denmark, out of 100 men in the age-group 15-24 who were killed in transport accidents, 28.4% died at sea; the percentage for the age-group 25-44 was 21.7.

Of 100 victims of transport accidents, an average of 70 men are killed by motor vehicles; for women, the percentage is 77. In some countries, the proportion has reached as high as 81.1% for men (Australia) and 90.4% for women (USA). Children and adolescents show the highest percentages of deaths caused by motor cars; about 78% for boys, and about 82% for girls. Some examples of the proportion of all transport deaths represented by those caused by motor vehicle traffic accidents, among boys, are : England and Wales (boys under 5) 92.4%; Finland (age-group 5-14), 91.9%; Switzerland (age-group 5-14), 91.7%; Australia (age-group 15-24), 88.2%. The percentage for females in some countries and in certain age-groups even reaches 100—e.g., in South Africa (European population), Finland, and Ireland for girls under 5 years; in Ireland for women over 75; in New Zealand for women in the age-group 65-74; and in Scotland for girls from 5 to 14 years.

Pedestrians are the chief victims of the motor car, children and old people being the most affected. Table II illustrates this point.

A comparative study of mortality from various causes among children under five years of age has shown that in some countries motor cars kill more children than do diseases such as measles, meningitis, diphtheria, and whooping cough.

Next to pedestrians, cyclists are most frequently the victims of motor car accidents.

TABLE II. PERCENTAGE OF DEATHS AMONG PEDESTRIANS AT CERTAIN AGES COMPARED WITH ALL DEATHS CAUSED BY MOTOR VEHICLE ACCIDENTS

Country	Males		Females	
	under 5 years	*75 years and over*	*under 5 years*	*75 years and over*
Japan	92.9	91.7	95.7	90.9
Ireland	85.7	90.9	66.7	100.0
Italy	88.1	94.8	88.3	91.5
England and Wales	92.7	85.8	90.0	90.7
Scotland	97.6	88.9	88.9	86.7

In Denmark, for example, out of 100 boys aged 5 to 14 who died in traffic accidents, 59 were cyclists; for girls in the age-group 15-24, the proportion was 73. Accidents involving young motor-cyclists also take a considerable toll : of all deaths among males aged 15-24 years that were caused by motor accidents, the percentage of motor-cyclists in England was 64; in Denmark, 63; in Australia, 56; and in Switzerland, 55.

A final table in the report gives the mortality from certain categories of transport accidents in selected countries in the latest year for which statistics are available. The total deaths from transport accidents, for all ages, *per 100,000 population* of each category are as follows :

	Total	*Males*	*Females*
Australia, 1951	29.9	49.2	10.1
Canada, 1952	25.4	39.6	10.9
USA, 1949	25.2	39.9	10.7
Switzerland, 1951 . . .	20.2	33.9	7.1
South Africa, 1950 (European population) . .	20.1	33.4	6.7
Germany, Federal Republic, 1951	19.3	33.2	7.1
New Zealand, 1952 . . .	18.1	30.5	5.6
Denmark, 1951	15.1	24.5	5.9
Scotland, 1951	13.4	22.2	5.4
England and Wales, 1951	12.8	20.7	5.5
Netherlands, 1952 . . .	12.7	20.7	4.8
Italy, 1951	12.2	20.8	3.9
Finland, 1952	11.8	19.1	5.2
Japan, 1951	9.5	14.9	4.2

Health Legislation

COMPARATIVE STUDY : SMALLPOX VACCINATION

A comparative study of the legislation on smallpox vaccination in 50 countries has recently been published in the *International Digest of Health Legislation*.[1]

Studies on the incidence of smallpox in the world today show that, on the one hand, there are endemic regions in Asia, Africa, and America while, on the other hand, there are countries from which the disease has practically disappeared. Smallpox can, however, be spread rapidly from these endemic regions to areas that are free from it; and a number of foci have, in fact, been introduced into several European countries during the past few years.

The measures taken by different countries against this disease also take two main forms: certain countries tend to rely on the effectiveness of their public-health services to protect them against the introduction of smallpox and seem more and more inclined to dispense with compulsory vaccination; other countries, however, continue to insist upon the compulsory vaccination of their population.

Owing to scientific, social, and economic factors, vaccinal legislation has been considerably modified in many countries. Among the scientific factors are advances in knowledge of the duration of the immunity conferred by vaccination and of the risk of post-vaccinal complications, and the introduction of new techniques of vaccination.

The study published in the *Digest* shows that at present most countries have compulsory vaccination laws, though the enforcement regulations vary from one country to another. The differences in legislative texts have been analysed under the following headings : compulsory vaccination, primary vaccination, revaccination, emergency vaccination, group vaccination, vaccination as a prerequisite for admission to school, post-vaccinal inspection, grounds for exemption, vaccinators, technique of vaccination, and vaccination registers. There are also two appendices : the first gives, in the form of a synoptic table, an outline of the principal sections of the study; the second summarizes the techniques of vaccination in use in certain countries.

Even in the few countries where vaccination is no longer systematically enforced, there are restrictive clauses which make it indirectly compulsory. When, for example, there is a risk of infection, vaccination may be made compulsory for the household or other contacts of a person suffering from smallpox. Conscientious objection to vaccination is not always allowed; in two countries conscientious objection is sustained only if the objector has sufficient intelligence and knowledge to form an opinion on the matter.

The age prescribed for primary vaccination is usually within 12 months following birth, rarely later. Some countries no longer require persons to be revaccinated, despite the limited duration of the immunity which vaccination affords; others, however, require persons to be revaccinated at frequent intervals, sometimes every four, or even every three, years. When an outbreak of smallpox occurs, vaccination is generally imposed on certain specified groups or on the population as a whole; however, provision is made for exemption if vaccination has been performed

[1] *Int. Dig. Hlth Leg.* 1954, 5 221., This study will also appear as an offprint. Price: 3/6 $0.50 Sw. fr. 2.–.

within a stipulated period, the duration of which varies from country to country.

In many countries, vaccination is compulsory for certain groups of the population. Such groups include the medical and auxiliary medical professions. Experience in recent years shows that these groups are especially exposed to infection; and, in view of the risk they run, the annual revaccination of members of such professions has been recommended. In certain countries, legislation makes vaccination compulsory for members of the public-health services or for public servants (e.g., customs officials, policemen, postmen, railway workers, etc.). Vaccination is sometimes also prescribed for the inmates of hospitals for the chronic sick, of mental homes, of leper asylums, and the like.

Vaccination is a prerequisite for the admission of a child to school in many countries. This is the case, for instance, in several states of the United States.

Exemption from vaccination is usually granted on medical grounds; the nature of such grounds is sometimes left to the discretion of physicians, sometimes specified in the law.

Vaccination is usually performed by a physician; but, in a number of countries, certain categories of auxiliary medical workers and sometimes even lay persons are authorized to perform vaccination during epidemics or because of a shortage of medical staff. Post-vaccinal results are usually inspected by physicians. The timetable for such inspections varies according to the country; as to the interval specified, some legislative texts now take into account accelerated or vaccinoid reactions and the normal vaccinal reactions.

The technique of vaccination is rarely specified in legislation. In some countries, the scarification method is prescribed, though there may be certain variations in the technique. In recent years, the so-called " multiple pressure " method has also been introduced in a number of countries.

Monograph on Milk Pasteurization

. . . " This is the sort of thing that the World Health Organization and allied bodies do well. With the status that they have and the machinery and resources at their disposal, they can ensure, with certain limitations, a world-wide sharing of the best available knowledge on matters important to the common welfare. Pasteurization is a good example of such a matter. Kay and his colleagues point out that no human activity can ever be above the risk of occasional error; but experience has shown that pasteurization is a reliable shield and safeguard for all milk consumers if, to adequate planning at the outset, are added sound modern plant and equipment, skilled and conscientious management and thorough laboratory control, regularly exercised from the farm to the ultimate consumer. The monograph shows how this can be done. The rest is the responsibility of governments and others on the spot." —Review in *The Medical Journal of Australia* (1953, **2**, 15, 573) of *Milk Pasteurization*, by Kay et al.

CORRIGENDUM

1954, Vol. 8, No. 1 (January), p. 6, footnote 1

Delete the *World Health Organization : Technical Report Series*

Insert a forthcoming number of the *Chronicle*. *

* See page 129 of this number of the *Chronicle*.

Notes and News

Executive Board : Thirteenth Session

The Executive Board held its thirteenth session, in Geneva, from 12 January to 2 February 1954. Dr. Melville D. Mackenzie (designated by the United Kingdom) was Chairman; other officers were Ambassador F. Hurtado (Cuba) and Dr. F. S. Maclean (New Zealand), Vice-Chairmen; and Dr. H. van Zile Hyde (USA) and Dr. S. Hayek (Lebanon), Rapporteurs.

Among the more important items on the Board's very heavy agenda was a detailed review of the programme and budget of the Organization for 1955. The Director-General requested a regular budget of $10,300,000, which represented an increase of $1,800,000 over that of the previous year. He explained that one of the reasons for this increase was to compensate for the shortfall in Technical Assistance funds. He proposed that three-quarters of the additional amount requested be used for field operations, including $600,000 for continuing joint UNICEF/WHO projects, $500,000 for fellowships, and $200,000 for other projects.

The proposed programme follows the same lines as that of previous years, except that greater emphasis is to be placed on positive promotion of health. Occupational health is among the subjects to receive added attention : co-operation with the ILO is to be continued, new activities have been proposed, and attention has been called to the desirability of avoiding duplication of activities in the work of the two organizations. Acting upon a suggestion of the Government of Austria, the Board recommended that a study of the possibilities of preparing international regulations for the protection of workers and the general public against roentgen and isotopic radiations be undertaken. Another study which was recommended concerns the standardization of laboratory tests of foods, it being suggested that WHO, in co-operation with FAO, collect and disseminate information on selected groups of chemical additives to foods.

Reports of the year's activities in the WHO Regions were presented to, and noted by, the Board. Two problems of regional interest particularly drew the Board's attention : the question of a permanent site for the Regional Office for Europe, and the difficulties involved in holding meetings of the Regional Committee for the Eastern Mediterranean. The Regional Committee for Europe was requested to consider the former problem, at an early session if possible, taking into account recent proposals submitted by the Governments of Austria and Switzerland. The Seventh World Health Assembly was invited to study a procedure by which the Regional Committee for the Eastern Mediterranean might meet and carry out its functions by means of the two subcommittees contemplated in a resolution of the previous Health Assembly.

In a biennial review of WHO's official relationship with non-governmental organizations, the Board confirmed the maintenance of relations with 25 organizations. Three non-governmental organizations were accepted into official relations with WHO : the International Committee of Catholic Nurses and Medico-Social Workers, the Medical Women's International Association, and the Union O.S.E. (Worldwide Organization for Child Care, Health, and Hygiene among Jews).

The Board examined in detail a preliminary report on programme analysis and evaluation which had been prepared by the Director-General and recommended that this study be continued and further developed. The reports of a number of expert groups were also reviewed and noted.

The Board will meet for its fourteenth session on 27 May 1954, in Geneva.

The resolutions and report of the Board will be found in *Official Records* Nos. 52 and 53.

Darling Foundation Prize to be Awarded at Health Assembly

Dr. G. Robert Coatney and Professor George Macdonald will be awarded the Darling Foundation Prize and Medal by the Seventh World Health Assembly. This prize, which consists of a bronze medal and a sum of 1,000 Swiss francs, is given to the author, or authors, of original work on malaria. It is in honour of Dr. S. T. Darling, who was accidentally killed during a study mission of the Malaria Commission of the League of Nations in 1925. The Foundation is now administered by WHO, and the recipients of the prize are chosen by a special committee appointed by the Organization. The last award was made, in 1951, to two British scientists, Professor H. E. Shortt and Dr. P. C. C. Garnham.[1]

Dr. Coatney, of the Laboratory of Tropical Medicine, National Institutes of Health, Bethesda, Md., USA, is known for his research on the therapy and prophylaxis of malaria by antimalarial drugs. Professor Macdonald, Director of the Ross Institute of Tropical Hygiene and Professor of Tropical Hygiene at the University of London, has made important contributions to knowledge concerning the epidemiology of malaria.

[1] See *Chron. Wld Hlth Org.* 1951, 5, 59.

Eighth World Health Assembly May Be Held in Mexico

The WHO Executive Board, at its thirteenth session, unanimously decided to recommend to the Seventh World Health Assembly that it accept the invitation of the Government of Mexico to hold the Eighth Assembly (1955) in Mexico City.

New Regional Director for Africa

On 1 February 1954, Dr. F. J. C. Cambournac, former Director of the Malaria Institute in Lisbon, Portugal, became Regional Director for Africa. He succeeds Dr. F. Daubenton, who has retired after many years of health work in Africa.[2]

Dr. Cambournac was born in Portugal in 1903. He studied medicine at the University of Lisbon and later specialized in tropical medicine in Lisbon, London, and Hamburg. He has had wide experience of health conditions in Africa; for example, he has served with groups studying specific disease problems in Portuguese Guinea and in Angola. He is well known as a malaria specialist, is a member of the WHO Expert Panel on Malaria, and has acted as a WHO malaria consultant in Africa. Dr. Cambournac represented his Government at the International Health Conference in New York in 1946 and has been a member of the Portuguese delegation at several World Health Assemblies.

Waterworks Seminar in South-East Asia

In December 1953, a two-week seminar for waterworks operators was held in New Delhi, India. A co-operative project of WHO and the Ministry of Health of India, this seminar provided a short course in the principles and practices of water purification for about 45 waterworks superintendents from Burma, Ceylon, India, and Indonesia. The "faculty" included nine State sanitary engineers from India and experts from the Netherlands, WHO, the Foreign Operations Administration of the USA, and the Indian Ministry of Health.

In an address of welcome to the participants in the seminar, Dr. C. Mani, Director of the WHO Regional Office for South-East Asia, stressed the fact that lack of adequate environmental hygiene was the largest single cause of preventable disease and loss of manpower in the Region. Almost three-fourths of the population, he declared, drink unsafe water, make little effort to dispose of excreta properly, prepare milk and food without regard to principles of hygiene, live in unfit dwellings, and are constantly exposed to insect and rodent carriers of disease.

The seminar aimed to help in improving existing water-supply installations, of which there is a considerable number but of which many are in a state of deterioration because of poor operating practice and lack of adequate maintenance.

World Health Day : 7 April 1954

World Health Day was observed on 7 April 1954. Since this year marked the centenary of the beginning of Florence Nightingale's "pioneer work in the fields of nursing and sanitation", the theme chosen for observance was nursing and its significance for health in the modern world, as embodied in the phrase "The Nurse—Pioneer of Health".

In calling the attention of Member Governments to the celebration of this day, the Director-General wrote:

"With each passing year, World Health Day is welcomed by an increasing number of national and local health authorities throughout the world as an added and valuable occasion for stimulating populations everywhere to a deeper understanding of their own health needs and health problems, and for making people aware of the existing possibilities for health improvement which can be realized only with their co-operation ... It is hoped that all Member Governments will observe World Health Day in 1954, both nationally and locally ..."

Sixth Seminar on World Health

Announcement has been made, by a circular letter from the Director-General, that the World Federation of United Nations Associations (WFUNA) is organizing a Seminar on World Health, to be held in Geneva during the Seventh World Health Assembly in May 1954. This is the sixth such seminar. As in previous years, the participants will be selected through national and student associations affiliated or co-operating with WFUNA in various countries. It is hoped that governments will be willing to give grants-in-aid to individual participants desiring to attend the seminar but unable to defray their own expenses.

The World Health Organization is not associated with the seminar in any official capacity. However, Regional Directors and Headquarters staff will give lectures on WHO and its activities, and seminar participants will be able to attend sessions of the Assembly and to obtain information and documentation made available to them through the Secretariat.

Inquiries concerning the Sixth Seminar on World Health should be addressed to the World Federation of United Nations Associations, 1 avenue de la Paix, Geneva, Switzerland.

[2] See *Chron. Wld Hlth Org.* 1952, 6, 52.